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ABSTRACT

The entry level cardiovascular condition test scores of 45 cadets at the Criminal Justice Training Institute (Florida) were compared with test scores after the cadets participated in a 15-week conditioning program. The test consisted of running, push-ups and sit-ups, and bench and leg presses. The conditioning program was designed to increase cardiovascular endurance and reduce stress, and ultimately, increase the fitness and longevity of the cadets. Results verified that there was a significant difference between pretest and posttest cardiovascular condition test scores. Cadets demonstrated that they were more aware of their conditioning level and of the importance of cardiovascular conditioning and physical fitness as a stress reduction method. The report recommends that the program become a permanent program at the Criminal Justice Training Institute and be introduced to law enforcement agencies in Palm Beach County, Florida. Appendices contain an assessment sheet and fitness profile, test scores, and statistical data. (Contains 17 references.) (JDD)

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THE EFFECTS OF CARDIOVASCULAR CONDITIONING ON STRESS LEVELS OF LAW ENFORCEMENT CADETS

POLITICS, LAW AND ECONOMICS OF HIGHER EDUCATION

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A Practicum Report presented to Nova University in partial fulfillment of the requirements for the Degree of Doctor of Education

Nova University

March, 1994

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Abstract of a Practicum Report Presented to
Nova University in Partial Fulfillment of
the Requirements for the Degree of
Doctor of Education

THE EFFECT OF CARDIOVASCULAR CONDITIONING ON STRESS LEVELS OF LAW ENFORCEMENT CADETS

by
Frederick Van Dusen

MARCH, 1994

During a training year, the Criminal Justice Training Institute conducts approximately 7 Police and Corrections Academies, which enroll nearly 280 cadets. All applicants are required to take a medical examinations to fulfill their health requirement for employment, however they are not assessed for physical fitness nor cardiovascular conditioning. This is a problem because stress, overweight, smoking and the lack of conditioning, are known to be the leading causes of heart problems. Police officers are viewed as public officials of whom much is required. Because

of the unique nature of the police officer's work, physical fitness and conditioning is necessary. The economic burden on society is overwhelming, with estimated cost due to lost wages, lost productivity, and medical expenses, exceeds $94.5 billion yearly.

The purpose of this practicum was to evaluate the impact of cardiovascular conditioning on the stress and physical fitness levels of the cadets by comparing the applicants' entry level cardiovascular condition test scores, to the cardiovascular condition test scores after the cadet's participated in a 15 week conditioning program. The conditioning program was designed to increase cardiovascular endurance and to reduce stress, and ultimately, increase the fitness and longevity of the cadets.

The procedures used for evaluating the impact included: a search and review of related literature addressing cardiovascular conditioning, stress indicators, fitness levels, and law enforcement concerns for physical fitness; obtaining and

evaluating testing instruments form other sources; and obtaining input and feedback from other staff members.

The results of this evaluation study verified that there was a significant difference between the pretest and posttest cardiovascular condition test scores, after the completion of the 15 week cardiovascular conditioning program.

It can be concluded from the results of this study that a cardiovascular conditioning program can improve physical performance, reduce stress, boost public image and reduce health cost, of law enforcement personnel and cadets.

It is recommended that the cardiovascular conditioning program become a permanent program at the Criminal Justice Training Institute. Also, that the program be recommended and introduced to the law enforcement agencies throughout Palm Beach County.

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Chapter 1

INTRODUCTION

Background and Significance

Palm Beach Community College which was the first "Junior College" in the State of Florida, encompassing four campuses within the Palm Beach County area. In 1973, The Florida Department of Law Enforcement certified the central campus of the Palm Beach Community College as a regional training site for basic recruit, specialized and advanced training for local law enforcement and correction officers.

The Criminal Justice Training Institute currently provides training for 2,959 full-time and auxiliary officers, working for 32 law enforcement agencies in Palm Beach County (FDLE, 1992).

Nature of the Problem

During a training year, the Criminal Justice Training Institute conducts approximately 7 Police and Corrections Academies which enroll nearly 280 cadets. All applicants are required to take a medical examination to fulfill their health requirements for

employment, however, they are not assessed for physical fitness nor cardiovascular condition. This is a problem because stress, overweight, smoking, and lack of conditioning, are known to be the leading causes of heart problems. In 1990, close to 1.5 million Americans suffered either their first or a repeated heart attack, resulting in approximately 540,000 deaths per year. Approximately 30% of those experiencing a first heart attack die instantaneously or within hours. Among repeat suffers, nearly 50% will die almost immediately. The most tragic condition surrounding these statistics is that the ages of the suffers, many of whom in their most productive, middle aged years (Gordon, 1990), are the same ages as many law enforcement officers.

The Criminal Justice Training Institute has begun assessing each applicant's cardiovascular condition before the beginning of classes, including their current level of physical fitness. Since cardiovascular testing is a new procedure at the Criminal Justice Training Institute, the cadets condition upon entry and

their condition following a rigorous physical training program must be evaluated.

Police officers are viewed as public officials of whom much is required. In addition to other duties, it is not unusual for police officers to be called upon to: fight and wrestle with offenders; pursue suspects on foot; remove or lift injured persons; push motor vehicles; change tires; remove debris from the roadway; climb stairs, trees, walls, fences and steep embankments; lift and carry evidence, records and files; sit or stand for long periods of time, or run for cover, to name just a few. Because of the unique nature of the police officer's work, physical fitness and conditioning is necessary.

Physical exercise can play an important part both in reducing stress and in increasing one's ability to cope with stressful situations. Although dedication and an unavoidable amount of discomfort are involved, especially in the early stages of a physical conditioning program, the results can be extremely rewarding to the individual (Swanson, 1993).

Swanson's studies at the Dallas Police Department, Los Angeles County Sheriff's Department, and the Aerobic Clinic of Dallas, show the comparatively inferior condition of the average police officer. In the Dallas study, the participants in the experimental group engaged in a consistent program of physical exercise demonstrated a 42% decrease in sick days. The control group showed a 5% increase in sick time.

Although all types of physical exercise are beneficial, the greatest value is derived from aerobic exercise, those that involved the sustained exchange of oxygen. Aerobic exercises, in particular, benefit the cardiovascular system (Swanson, 1993).

A recent report from the National Institute of Mental Health, edited by William P. Morgan, M.D. from the University of Wisconsin, noted that present clinical and experimental evidence overwhelmingly supports the view that vigorous exercise can reduce levels of state anxiety in both normal and clinically anxious individuals. Moreover, a chronic training program may help improve self-esteem and decrease the

mild to moderate anxiety and depression associated with trait anxiety. Evidence also shows that improved physical fitness is associated with mental health and well-being and that beneficial emotional effects of exercise training occur across all ages and sexes (Williams, 1990).

Knowing these facts, the Criminal Justice Training Institute has begun assessing every applicant's cardiovascular condition prior to the beginning of classes, and physical fitness training. Since cardiovascular testing was a new procedure at the training institute, the cadets entry level condition and condition following a rigorous physical fitness training program was evaluated.

Purpose of the Study

The purpose of this practicum was to evaluate the impact of cardiovascular conditioning on the stress and physical fitness levels of the cadets by comparing the applicants' entry level cardiovascular condition test scores, to the cardiovascular condition test scores after the cadets participated in a fifteen week

conditioning program. The conditioning program was designed to increase cardiovascular endurance and to reduce stress, and ultimately, increase the fitness and longevity of the cadets.

Significance to the Institution

The results of this study will enable the Criminal Justice Training Institute to assess the cadets cardiovascular fitness and the effectiveness of the physical fitness training program as a method of reducing stress and improving their cardiovascular condition during their academic stay.

The fundamental goal of a stress management program in the work setting is to reduce the burden of stress related problems to the employees and the organization itself. This study has provided the Criminal Justice Training Institute with information on the effectiveness of the cardiovascular conditioning program by demonstrating that there is a difference in the applicant's cardiovascular condition between the pre and posttest scores. The difference demonstrated by this program proved beneficial to the Criminal

Justice Training Institute. It has provided the necessary criteria to fulfill the purpose of this study and to recommend the continuation of this cardiovascular conditioning program at the Criminal Justice Training Institute. The significant long term effect of this program is the psychological and physiological impact resulting from aerobic exercise (cardiovascular conditioning).

The results from aerobic exercise facilitates the release of physical and mental tensions for a period of time that extends beyond the actual workout. This continued relaxed state can improve the performance of the law enforcement officer (Cooper, 1983). It is the duty and goal of any institution of higher education to provide the best education, and to prepare the student for today's society.

Relationship to the Seminar

This practicum report is related to politics, law and economics of higher education seminar that covers theory, issues and practices in an educational setting. The emphasis of this seminar places leadership roles

and policy decision making in current emerging context of political, legal and economic factors affecting postsecondary education.

Research Question

The research questions were: Does the comparison of the pretest cardiovascular condition score given at the beginning of the academy to the posttest cardiovascular condition score received at the end of the 15 week physical conditioning program demonstrate a difference?. Has there been a significant reduction in the stress indicators of the cadets over the fifteen week conditioning program?

Research Hypothesis

Cadets that participated in a 15 week physical conditioning program will improve their cardiovascular condition and the reduction of stress indicators. The results of this study will indicate a significant increase in cardiovascular conditioning of the cadets participating in the 15 week conditioning program.

The null hypothesis is that the training program will produce no significant difference in the

cardiovascular conditioning program. The alternate hypothesis is that the posttest cardiovascular condition score will be equal to, or greater than the pretest cardiovascular condition score. The t-test of the independent means at the < .05 level of significance will be used.

Chapter 2

Review of Related Literature

Physical exercise can play an important part in reducing stress and in increasing one's ability to cope with stressful situations. Although dedication and an unavoidable amount of discomfort are involved, especially in the early stages of physical conditioning program, the results can be extremely rewarding to the individual (Swanson, 1993).

Swanson's studies at the Dallas Police Department, Los Angeles County Sheriff' Department, and the Aerobic Clinic of Dallas show the comparatively inferior condition of the average police officer. In the Dallas study, the participants in the experimental group who engaged in a consistent program of physical exercise demonstrated a 42% decrease in sick days. The control group showed a 5% increase in sick time. A decrease in sick days would constitute a savings to the agency.

A report from the National Institute of Mental Health (Morgan, 1985) noted that present clinical and experimental evidence overwhelmingly support the view

that a bout of vigorous exercise can reduce levels of state anxiety in both normal and clinically anxious individuals. Moreover, a constant training program may help improve self-esteem and decrease the mild to moderate anxiety and depression associated with trait anxiety. Evidence also shows that improved physical fitness is associated with mental health and well-being and those beneficial emotional effects of exercise training occurs across all ages and sexes (Williams, 1990)

Our mental health or perception determine the conscious or subconscious interpretation of external stressors. They decide whether the external event is positive stressor, negative stressor, or a unimportant external event. This decision represents perceptual control and determines whether a message is sent to the physiological system to respond to the stressor or to ignore it.

If our perception is that the stressor is something to worry about, then the body experiences the "stress response". This means the body prepares for

action by increasing muscle tension, heart rate, blood pressure, strength and energy producing hormones, diameter of the pupils, and brain wave frequency (Bruess, 1994)

Current research continues to confirm a direct relationship between the amount of stress encountered in everyday life and sickness, premature aging, and poor performance in work, academics and athletics. Everywhere from college classroom to corporate boardrooms, people discuss and complain about stress. Many of us confuse stress with nervous tension or anxiety; although those feelings may be a part of stress, they are not the whole picture. Whether you have stress related symptoms now, you court the possibility of suffering from stress or a stress related disorder (Smith, 1990).

Multiple factors contribute to stress and our stress responses, including physiological reactions, psychological factors, environmental distressors, and social factors. Each of these elements influences our stress responses in different ways, depending on the

stressful circumstances, our general health, personal health habits, psychological state, personality, attitudes, and the quality of our support system. Thus, responses to stress vary considerable from one person to another (Donatelle, 1991).

Stress is any physical, social, or psychological event or condition that triggers a stress reaction. Stressors may be tangible, such as an angry command officer, or a disgruntled homeowner, or a motorist stuck in traffic, or indiscernible, like the emotions associated with anticipation, or imagination. Our response to stressors causes strain to develop in our lives. Strain results from the wear and tear our minds and bodies sustain during the process of resisting or coping with the stressors in our lives.

The role of stress in disease is complex. Much depends on the individual and the situation. What is clear is that people who have too many stressors in their lives or who handle stressors poorly are at risk for a wide range of problems. In the short term, the problem might just be a cold, a stiff neck, or a

stomach ache. In the long term, the problems can be more severe, cardiovascular disease, high blood pressure, or impairment of the immune system (Insel, 1994).

Stress and an individual's method of handling it have been associated with the risk of developing heart disease, cancer, and other illnesses. While stress is an inevitable part of life, excessive amounts of it can contribute to poor health.

Sometimes you seem to get sick when you can least afford it, during work, or when you are going on vacation, or when you are getting ready for a promotional examination. A growing body of evidence suggests that this is more than mere coincidence. It appears that stressors can have a direct bearing on the body's ability to fight off viruses and other disease agents. Studies have shown that anxiety, depression, anger, overexertion, and sleep deprivation are all associated with temporary decline in immune function (Insel, 1994).

Law enforcement is considered a stressful job due to the nature of the environment. The day to day dealings with the darker side of society, the hours, shift work, working weekends and holidays, abnormal eating habits, and the family problems. These are some of the stressors that can significantly influence the future health of law enforcement officers.

Law enforcement deals with the unexpected, which in most cases becomes a physical response to stressors. After entering into a intersection when the traffic light turns green, the body experiences a sensation that another car entering the intersection at the same time. With just a fraction of a second to spare, the car is halted. In that split second of danger, and in the moments following it, the body has experienced a predictable series of physical reactions (Selye, 1979). Selye termed this predictable pattern the general adaptation syndrome (GAS). Selye divided GAS into three distinct stages: alarm, resistance, and exhaustion.

GAS alarm is the instance the body senses the oncoming car, an internal alarm sounds and the sympathetic branch of the autonomic nervous system takes command. For the most part, this part of your nervous system operates independently of conscious thought. It controls the heart rate, breathing, blood pressure, digestion, and hundred of other functions usually take for granted. It is also responsible for mobilizing the body for physical action in response to a stressor.

As the car travels closer, the body experiences the feeling of fear. The sympathetic nervous system, however, knows exactly what to do, and does it with breathtaking speed and efficiency. Its control center in the brain, the hypothalamus, orders the pituitary gland to release a chemical messenger called adrenocorticotropic hormone (ACTH) into the bloodstream. When ACTH reaches the adrenal glands, located just above the kidneys, it stimulates them to release cortisol and other key hormones into the bloodstream. Simultaneously, sympathetic nerves

instruct your adrenal glands to release the hormones epinephrine, or adrenaline, and norepinephrine, which in turns trigger a series of profound changes as they circulate throughout the body (Selye, 1979). The release of these hormones into the body causes hearing and vision to become more acute, and the bronchi to dilate allowing more air into the lungs. The heart rate accelerates to pump more oxygen through the body. The liver releases extra sugar into the bloodstream to provide an energy boost for the muscles and brain. Hormones also causes digestion to halt and, an increase in perspiration to cool the skin. Endorphins are released to relieve pain in case of injury. These almost instantaneous changes give the heightened reflexes and strength needed to dodge the car.

GAS resistance is the body's response to dramatic changes. Whenever normal functioning is disrupted, such as during the alarm reaction, the body strives for stability, a state in which blood pressure, heart rate, hormone levels, and other vital functions are maintained within a narrow range of normal. Once a

stressful situation ends, the parasympathetic branch of your nervous system takes command and halts the alarm reaction. This system calms the body down, slowing rapid heartbeat, drying sweaty palms, and returning breathing to normal.

GAS exhaustion is a state which, instead of getting on with everyday life, the body is confronted with a string of severe stressors. This group of events would cause the body to respond over and over with an alarm reaction. If stressors persist, or if a series of stressors occur in succession, readily available stores of energy can be depleted. When stores of energy reserves are used up, general exhaustion results.

Law enforcement personnel have a tradition of poor eating habits, and the quality and quantity of the food influences the body's susceptibility to stress. One of the first things consumed is coffee. Coffee is a substance which contains the chemical stimulant caffeine, which will increase the adrenaline level in the bloodstream. If a person pours on the caffeine

when already under stress, it will double the dose of adrenaline, causing the heart, hormonal systems, and nervous system to become twice as stressed (Smith, 1990).

During the last century, the American way of life became synonymous with the "good life," a life filled with abundant food, the best in medical treatment, and technological progress. Slowly but surely we began to consume more and more of the foods that have become a problem to our health. It is no wonder that cardiovascular diseases are the leading cause of death in the United States.

Although it is difficult to place a dollar value on the cost of human life, the economic burden of cardiovascular disease in our society is overwhelming. Estimates of lost wages, lost productivity, and medical expenses exceeds $94.5 billion every year. The 1990 edition of Heart and Stroke Facts, published by the American Heart Association, indicates that 5 million people alive today have a history of heart attacks, angina pectoris, or both. In 1990, 1.5 million

Americans had a heart attack, and more than 500,000 died. Of those, nearly 300,000 died during the 2 to 3 hour wait before seeking medical assistance (Donatelle, 1991).

Law enforcement personnel are included in the national figures for CVD, and their life expectancy is much lower than the national average. Law enforcement personnel has always been expected to be in good physical health.

The health benefits of exercise can be divided into five general categories; improved cardiovascular efficiency and health, more efficient metabolism and better control of body fat, improved psychological and emotional well-being, improved muscular strength and flexibility and improved health over the whole life span. Those who exercise regularly report that they feel better, have more energy, and often require less sleep. Regular exercisers often lose excess weight while improving muscular strength and flexibility. Greater body satisfaction is associated with increases in exercise participation, as are psychological

benefits such as enhanced self-esteem, greater self-reliance, decreased anxiety, and relief from mild depression (Bruess, 1994).

The heart is a muscle composed of highly specialized tissue. Because muscles become stronger and more efficient with use, regular exercise strengthens the heart, enabling it to pump more blood with each beat. It can therefore circulate blood with fewer beats per minute. A stronger, more efficient heart is better able to meet the normal and extraordinary demands imposed by everyday situations. The most important kind of exercise is Cardiorespiratory endurance (aerobic) exercise. It improves heart and lung functioning. As fitness pioneer Kenneth Cooper M.D., remarked, "you can live without big muscles or a nice figure, but you can't live without a healthy heart". Endurance exercise also protects the Cardiorespiratory system from the effects of stress. A physically fit person has a greater ability to tolerate the challenges of daily life. It is important to note that the physical and

psychological benefits of physical activity combine to enhance resiliency.

Since the publication of, The Aerobics Program for Total Well-Being, by Kenneth Cooper M.D., researchers have studied and documented the psychological impact resulting from aerobic excise. Their results show that aerobic exercises facilitate the release of physical and mental tensions. Not only do subjects feel more relaxed directly following a workout, but this positive effect continues for some time thereafter (Smith, 1990). Muscular strength and balance make a person less prone to injury. The danger of injury exists when, taking part in an active, stress producing activity, or attempting to match an earlier performance level, after a long layoff. This is very common among law enforcement personnel because, at one moment their at rest, and the next moment running full speed to apprehend a criminal.

In Parker v. District of Columbia, the Court of Appeals for the District of Columbia approved a $423,046.00 jury verdict on a claim in favor of a man

who was shot by a District of Columbia police officer in the course of an arrest. The theory supporting liability was "inadequate training". The court stated, "the District officer had received no physical fitness training in four years and was physically incapable of subduing Mr. Parker". The court further concluded: "Officer Hayes simply was not in adequate physical shape. This condition posed a foreseeable risk of harm to others. We are persuaded that a fair-minded jury could have concluded that Officer Hayes conduct was the result of deliberate indifference on the part of the District of Columbia with respect to physical training of its police officers".

In United States of America vs. City of Wichita Falls the court ruled that an applicant's successful completion of the physical assessment and physical agility test was necessary to an effective police officer. The physical assessment test used to screen applicants for entry into the police training academies. Applicants who successfully completed that test were subsequently required to pass a more

strenuous physical agility test after they had undergone physical training in the police academy.

The physical assessment test operated as a screening mechanism for entry into the police academy by analyzing the general fitness level of an individual instead of the individuals ability to perform certain tasks. Consequently, it is possible that the additional strength and increased motor ability necessary for the performance of police duties and successful execution of the physical agility test could be acquired during the 16 week police academy. The court further stated that, a test is validated if it is proven that the test improves the likelihood that the people selected can adequately perform the job for which the test was designed.

Furthermore, the physical assessment test is validated through the method of "constructed validity", meaning that the test accurately identifies characteristics necessary to perform a job.

The unique physical performance demands for specific occupational groups needs to be accounted for

in physical fitness programs for those specific groups. Physical fitness is being viewed as a public health issue. Specific national goals have been set and validity of fitness is being proven. In short, fitness is becoming institutionalized. However, law enforcement is behind the rest of society.

Physical fitness is starting to be view as job related. However, it is slow being accepted at the in-service level. For the past 10 years, the Institute of Aerobics Research has been involved in developing physical fitness programs for public safety and the military. Excuses such as cost and legal problems are offered to explain the lack of implementation. Over a five year period, The Institute of Aerobic Research reviewed federal and local municipal law enforcement agencies for man power shortages due to disability retirement and injuries. The finding were that at the federal level, disability retirement accounted for 76.6%, significant medical findings 72%, significant injuries 75.5%, and at the municipal level, disability retirement was at 87%, with 38% of the officers with a

serious health risk. All of these figures demonstrate a fitness related problems (Collingwood, 1990).

In recent years numerous court verdicts have been rendered within the lower court systems, as well as, out of court insurance settlements, resulting from failure to adequately train. With those cases and the cases brought before workers compensation board for work related injuries, are costing the law enforcement agencies and the tax payer millions of dollars.

Palm Beach Community College, Criminal Justice Training Institute, being the only training institute of higher education in this region, must take the leadership role addressing the current and emerging political, legal and economic factors affecting postsecondary criminal justice education and training.

Chapter 3

METHODOLOGY AND PROCEDURES

Methodology

An evaluation methodology was used in this practicum since the intended result was the evaluation of the pre and posttest cardiovascular condition test scores. This evaluation determined the effectiveness of the cardiovascular conditioning program at the Criminal Justice Training Institute. The cardiovascular condition test was developed by the Institute of Aerobic Research, (Cooper Clinic), Dallas, Texas.

During the course of a training year, the Criminal Justice Training Institute conducts approximately 7 Police and Corrections Academies which enroll nearly 280 cadets. All applicants are required to take a medical examination to fulfill their health requirements for employment, however, they are not assessed for physical fitness nor cardiovascular condition. To evaluate this problem statement a pre cardiovascular condition test and a post

cardiovascular condition test was given to each cadet. Following the initial test, the cadets participated in a 15 week conditioning program. Following the conditioning program, the cadets were administered the same cardiovascular condition test to determine their subsequent condition. The test results were based on those cadets who completed both the pre and post cardiovascular conditioning program tests.

Data Collection

The collection of the data was completed by two staff members from the Physical Education Department and one from the Criminal Justice Training Institute. The cadets were required to warm-up using a series of standard stretching exercises. The stretching exercises were conducted as a group at the same time. The cadets then prepared for the test that was given at 9:00 a.m. The test consisted of a one and one half mile run over a measured course (three one half mile loops), push-up and sit-ups for endurance level (within a two minute time period), and the bench and leg press for maximum strength. All cadets started at the same

time for the one and one half mile run, with their lap times given to them on each lap completed. The timing instrument used was a standard stop watch that is used for track and field events. At the end of the third lap each cadet was given his/her time, and it was recorded. This test has been nationally standardized by the Institute for Aerobic Research Clinic, Dallas, Texas. The treatment was a 15 week conditioning program which was the same for every cadet. All cadets in each academy participated in the planned schedule. At the end of the 15 week conditioning program the cadets were tested in the same manner as they were tested on the first test.

Sample

A random sample of forty-five (N = 45) cadet's was selected from law enforcement academies, with a total population of 280 cadets. The cadets were selected at random without regard to age, sex or conditioning level.

Instrumentation for scoring

The instrument (see Appendix A) that was used for the pretest and the posttest assessment was designed by the Institute of Aerobic Research, Dallas, Texas.

Data Presentation

Appendix A is the Institute of Aerobic Research raw data sheets. This instrument was used in both pre and post cardiovascular testing.

Appendix B is a presentation of the statistical data for the 45 cadet's who were tested.

Appendix C is the data presentation of the results of those comparisons.

Data Analysis

Null Hypothesis

The null hypothesis was that there will be no significant difference between the two cardiovascular conditions of the cadets who were measured prior to the physical conditioning program and after the physical conditioning program. The t-test of dependent (correlated) samples was used. The test of

significance was with a probability of occurrence level of less than .05 ($p < .05$).

Alternate Hypothesis

The alternate hypothesis was that there will be a significant difference between the two cardiovascular conditions of the cadets that were measured prior to the physical conditioning program and after the physical conditioning program.

Level of Significance

The level of significance chosen was the .05 ($p < .05$) level of significance. This means that there is 95% confident that the relationship is a real one; however a 5% error is acceptable due to a sampling error rather than real differences in population.

Region of Rejection

The region of rejection was determined with a two-tailed t-test at the .05 level of significance.

Statistical Test

The selected statistical test used was the t-test (correlated) that determines a significant difference between two sample means. The critical t-value was

determined by calculating a two tailed t-test at the .05 level of significance with 44 degrees of freedom (N - 1). The results of this calculation was a critical t-value of ± 2.02 region of rejection. If the t-value falls within this critical t-value of ± 2.02, then the null hypothesis will be rejected. If the computed t-value falls outside of the critical t-value of ± 2.02, then the null hypothesis will be accepted.

Definition of Terms

Adrenocorticotropic hormone (ACTH) is a hormone formed in the pituitary gland, that situates the outer layer of the adrenal gland to secrete its hormones.

The autonomic nervous system is the peripheral nervous system that, largely without conscious thought, controls basic body processes.

Cardiovascular Conditioning is the ability to perform large-muscle, dynamic, moderate to high intensity exercise for prolonged periods.

Cardiorespiratory Fitness is to enhance physical fitness, promote health by reducing risk for future development or recurrence of disease.

Cardiovascular Endurance is the ability to sustain moderate to high intensity exercise for a prolong period of time.

Cardiovascular Disease includes Angina Pectoris and heart attacks.

Cardiovascular Testing determines physiological responses to controlled exercise stress.

Endorphins are secretions by the brain that have a pain inhibiting effect.

Epinephrine is a hormone secreted by the medulla (inner core) of the adrenal gland: also called adrenaline, the fear hormone.

Fight or Flight reaction is a defense reaction that prepares the organism for conflict or escape by triggering hormonal, cardiovascular, metabolic, and other changes.

Norepinephrine is a hormone secreted by the medulla (inner Core) of the adrenal gland; also known as the anger hormone.

Significance is where a test is applied asking whether the difference between samples are big enough to signify a real difference between those samples.

State anxiety refers to any situational stressor that evokes the stress response. It is usually temporary and fades away when the stressor is removed.

Stress is the physiological response to any stressor.

Stressor is anything that causes the stress response in any given individual. Stressor may be physical in nature or may be mental or emotional in nature.

T test is the test generally used when we wish to compare two sample means from two groups.

Test of Significance is determination of whether the findings are due to chance or are statistically significant at a given probability level.

Trait anxiety represents a general disposition of an individual to psychological stressors. It is more permanent and is associated with one's personality.

Assumptions

An assumption of this practicum, was that the cardiovascular conditioning program can be adopted by other Criminal Justice Training Institutions. A second assumption was that the cardiovascular conditioning program could be adopted in it's original form or a modified form in the law enforcement agencies in Palm Beach County. Also, attrition of the cadets from the program would not impair the internal validity of the experiment.

Limitations

A limitation of this practicum was that testing procedures were only employed at this institution. The criteria for the foundation of this program originated from the Institute of Aerobic Research, Dallas, TX, who researched and developed the testing procedures.

The human factor of not being properly trained to administer the test, effects the validity of the program, was considered a limitation of this study. Any follow-up testing after the cadets are fully

employed by law enforcement agencies will be limited. The availability of the cadets (officers) who were tested while in the academies, is limited due to their schedules and work assignments is a limitation for follow-up studies. While other law enforcement agencies may benefit from this program, the original design was limited to Criminal Justice Training Institution at Palm Beach Community.

The small sample size (N = 45) limited the generalizations that were made to total population and the study was limited to only the cadets.

Chapter 4

RESULTS

The results of this evaluation study verified that there was a significant difference between the pretest and posttest cardiovascular conditioning test scores after completion of the 15 week cardiovascular conditioning program.

After the completion of the 15 week cardiovascular conditioning program, each cadets test scores were compared to the scores before the program. As a result of this, a difference score was generated and calculated for each cadet. The means of the difference scores were -7.133, -32.777, -11.977, 1.720, and -8.155, the standard deviations were 21.787, 72.587, 8.487, 1.031, and 7.719, the number (N) 45. As a result, the computed t-values were -2.20, -3.03, -9.47, 11.20, and -7.09.

The critical t-value ± 2.02 was compared with the all the computed t-values. All the computed t-values fell within the area of rejection outside the range of the critical t-value of $\pm$ 2.02 demonstrating a

significant difference. As a result, the null hypothesis was rejected that there would be no significant difference between the pre and post cardiovascular condition test scores after the completion of the 15 week conditioning program. As a result the alternate hypothesis was accepted.

Chapter 5

DISCUSSION, CONCLUSION, IMPLICATION, AND RECOMMENDATIONS

Discussion

The result of this study indicated that there was a significant difference between the pretest cardiovascular condition scores and the posttest cardiovascular condition scores after the completion of the 15 week conditioning program. The computed t-values of the scores were compared with the critical t-value of ± 2.02, indicating a significant degree of difference between the pre cardiovascular condition scores and the post cardiovascular condition scores. As a result of this difference, the null hypothesis was rejected at the .05 level of significant.

The effectiveness of the 15 week cardiovascular conditioning program demonstrated that the cadets are more aware of their conditioning level, and the importance of cardiovascular conditioning and physical fitness as a stress reduction method. The 15 week cardiovascular conditioning program did elevate the

cadets physical fitness condition, by improving their pre academy condition.

CONCLUSIONS

It can be concluded from the results of this study that the implementation of a cardiovascular conditioning program can prove to be beneficial to both the cadets and law enforcement personnel currently work. Police departments incur significant risks if they do not have a cardiovascular conditioning program for their officers. Police agencies are different from business and industry since police officers are charged with the responsibility of protecting the public in life and death matters. Further, it can be concluded from this study that a cardiovascular conditioning program can improve physical performance, boost public image, reduce absenteeism, and reduce health costs.

IMPLICATIONS

The implications of this study verify the importance of implementing a cardiovascular conditioning program at the Criminal Justice Training Institute and in the law enforcement agencies in Palm

Beach County. These agencies should implement a cardiovascular conditioning program that educates the officers and cadets to become more aware of their physical condition, and to take action to increase cardiovascular fitness. This can prove to be beneficial to both the agencies and personnel in the following ways:

1. Decrease in accidents.
2. Decrease in worker's compensation insurance.
3. Increase in productivity.
4. Increase in personal satisfaction levels.
5. Decrease the possibility of civil action.
6. Increase the general health levels of the police officers.
7. Increase the image of the officer and the department.

RECOMMENDATIONS

It is recommended that the cardiovascular conditioning program become a permanent program at the Criminal Justice Training Institute, as a health indicator to the new cadet. It is also recommended

that this program be introduced to the law enforcement agencies in Palm Beach County as a health indicator and maintenance program within those agencies.

It is further recommended that the cardiovascular conditioning test be administered before the cadet reach the academy, so they can better prepare themselves for the academy and get a head start on the future.

Implementation of this policy will provide an effective program to improve the cardiovascular conditioning, and reduce stress levels in both the cadets and law enforcement personnel. This implementation is cost effective, for both the Criminal Justice Training Institute and the law enforcement agencies in Palm Beach County, and may prevent liability related to inadequate training.

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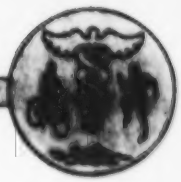
APPENDIXES

APPENDIX A

Cooper Clinic Data Sheet



ASSESSMENT SHEET

RAW SCORES _____

(Administrator's Name)

_____

(Participant's Name)

Resting Heart Rate _____ (beats/min.)

Resting Blood Pressure _____ (SBP mmHg/DBP mmHg)

Step Test _____ (beats/min.)

% Body Fat _____ (%)

Leg Press _____ (lbs. - left side) (RATIO)

Bench Press _____ (lbs. - right side) (RATIO)

1 Minute Sit-up N/A (number)

Sit and Reach _____ (inches)

1.5/12 min. Run _____ (time/distance)

Push-up _____ (number)

1/2 Squat N/A (number)

Jumping Jacks N/A (number)

Heel Raises N/A (number)

_____

Tricep Press N/A (lbs.)

Bicep Curl N/A (lbs.)

_____

_____

_____

_____

NAME_____

Fitness Profile

	Flexibility Sit & Reach	Cardiovascular Step 12 Min. 1.5	Absolute Strength BP LP	Dynamic Strength Sit-up	BC % Fat
Superior					
Excellent					
Good					
Fair					
Poor					
Very Poor					

Fitness Area	Tests	Raw Score	Fitness Level
Flexibility	Sit and Reach	_____	_____
Cardiovascular	3 Minute Step Test	N/A	N/A
Cardiovascular	12 Minute Run	_____	_____
Cardiovascular	1.5 Mile Run	_____	_____
Absolute Strength	1 Rep. Maximum B.P.	_____	_____
Absolute Strength	1 Rep. Maximum L.P.	_____	_____
Dynamic Strength	1 Minute Sit-up	_____	_____
Body Composition	Skinfolds	_____	_____

NAME_____

GOAL SETTING SHEET

I. FITNESS AREAS

1. CARDIOVASCULAR ENDURANCE
   a. Step Test
   b. 12 min walk/run
   c. 1.5 mile run

   Current Level_____
   Goal Level_____
   Behavioral
   Goal (e.g., time or distance)_____
   *Time_____
   BP LP

2. ABSOLUTE STRENGTH
   a. bench press
   b. leg press

   Current Level_____
   Goal Level_____
   Behavioral
   Goal (e.g., pounds)_____
   *Time_____

3. DYNAMIC STRENGTH
   a. sit ups

   Current Level_____
   Goal Level_____
   Behavioral
   Goal (e.g., repetitions)_____
   *Time_____

4. FLEXIBILITY
   a. sit and reach

   Current Level_____
   Goal Level_____
   Behavioral
   Goal (e.g., inches)_____
   *Time_____

5. BODY COMPOSITION
   a. skinfolds
   b. hydrostatic weighing

   Current Level_____
   Goal Level_____
   Behavioral
   Goal (e.g. percent of fat)_____
   Goal Body Weight_____
   *Time_____

*Time = time to reach goal

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PROCEDURES FOR DETERMINING GOAL BODY WEIGHT

$$\frac{\text{LBW Now (\%)}}{\text{LBW Goal (\%)}} \times \text{CBW} = \text{IBW}$$

1. Determine lean body weight now (LBW) in terms of percent (decimal)
   Subtract % fat now from 1.00

2. Determine goal lean body weight (GBW) in terms of percent (decimal)
   Subtract goal percent fat from 1.00

3. Determine Ideal Body Weight (IBW)

Example

Person 20% fat, wants to be 15% fat, weighs 200 pounds

(1) Total 1.00 (2) Total 1.00 (3) .80 X 200 = 188

%Fat now - .20 Goal %Fat - .15 .85

%Lean now = .80 Goal %Lean = .85

APPENDIX B

DATA PRESENTATION FOR CADET TEST SCORES

Cardiovascular Conditioning Test Scores

N	Bpress	Bpress2	Pushup	Pushup2	Situp	Situp2	LPress	LPress2	Run	Run2
1	115	120	13	16	40	46	265	290	16.49	16.49
2	210	225	35	51	32	42	360	360	15.13	13.11
3	180	195	32	42	36	42	485	560	13.04	10.59
4	275	295	46	65	36	50	510	560	31.21	11.16
5	345	355	32	46	25	36	560	560	15.18	13.17
6	215	245	31	30	43	47	560	560	11.52	10.43
7	275	295	45	54	25	34	460	560	14.30	13.16
8	195	225	29	65	32	77	385	435	10.34	9.32
9	100	115	23	35	40	46	265	265	14.36	12.35
10	215	180	24	45	34	45	435	560	15.40	13.15
11	115	160	12	25	40	44	385	410	16.11	16.00
12	225	485	45	53	43	52	485	560	11.46	11.00
13	330	460	47	68	60	65	460	560	12.05	11.30
14	245	255	50	67	37	46	385	485	11.46	9.34
15	180	195	30	50	45	57	330	435	13.20	10.57
16	270	275	67	78	45	53	465	460	14.48	11.26
17	340	345	40	68	37	48	560	560	13.09	11.58
18	245	245	41	42	31	32	485	460	13.40	11.09
19	195	195	35	52	40	52	360	435	14.48	11.53
20	195	205	36	38	42	43	385	435	16.03	11.25

21	215	260	50	59	55	48	460	485	12.44	11.52
22	100	115	42	60	43	42	265	285	15.12	14.07
23	195	225	40	46	25	32	510	520	16.20	13.15
24	215	245	36	41	45	50	510	535	13.57	12.04
25	165	175	36	50	52	61	385	385	14.20	12.31
26	100	115	19	36	40	45	185	195	17.49	14.48
27	180	190	30	45	46	50	385	410	14.48	13.07
28	180	245	37	45	43	50	410	440	12.39	11.33
29	180	215	30	40	35	50	385	395	14.48	11.28
30	195	245	36	48	46	58	410	510	11.27	10.45
31	180	195	36	54	38	54	385	485	16.40	13.35
32	180	195	35	40	37	47	310	360	16.49	14.52
33	165	185	32	44	54	54	385	410	14.47	12.41
34	100	135	31	55	40	48	240	240	15.00	13.20
35	245	265	30	42	33	45	535	545	13.57	12.04
36	145	150	22	27	32	36	290	335	14.43	13.28
37	225	245	54	55	46	48	460	500	11.23	10.40
38	115	135	50	53	40	46	240	290	14.28	12.39
39	225	245	27	31	42	37	385	410	10.53	9.55
40	225	245	55	50	44	49	520	535	12.44	11.40
41	115	135	45	64	30	43	240	360	10.23	10.55
42	145	150	31	40	30	38	290	360	16.54	14.20

43	225	225	20	49	28	43	435	535	19.20	16.00
44	165	185	26	37	39	47	310	360	13.10	12.45
45	225	275	50	51	42	46	460	510	10.53	10.08

APPENDIX C

Presentation of the Statistical DATA

STATISTICAL DATA

Variable	Number of Pairs	2-tail Sig	Mean	SD	SE of Mean
BPress	45	.000	197.111	61.362	9.147
BPress2			216.111	61.818	9.215

Paired Differences

Mean	SD	SE of Mean	t-value	df	2-tail Sig
-19.000	16.842	2.511	-7.57	44	.000

Variable	Number of Pairs	2-tail Sig	Mean	SD	SE of Mean
LPress	45	.000	399.444	97.784	14.577
Lpress2			422.777	99.759	14.871

Paired Differences

Mean	SD	SE of Mean	t-value	df	2-tail Sig
-43.333	38.964	5.808	-7.46	44	.000

Variable	Number of Pairs	2-tail Sig	Mean	SD	SE of Mean
Pushup	45	.000	35.844	11.328	1.689
Pushup2			47.822	12.583	1.876

Paired Differences

Mean	SD	SE of Mean	t-value	df	2-tail Sig
-11.977	8.487	1.265	-9.47	44	.000

Variable	Number of Pairs	2-tail Sig	Mean	SD	SE of Mean
Run	45	.000	13.884	2.061	.307
Run2			12.163	1.716	.256

Paired Differences

Mean	SD	SE of Mean	t-value	df	2-tailed Sig
1.720	1.031	.154	11.20	44	.000

Variable	Number of Pairs	2-tail Sig	Mean	SD	SE of Mean
Situp	45	.000	39.044	7.758	1.156
Situp2			47.200	8.349	1.245

Paired Differences

Mean	SD	SE of Mean	t-value	df	2-tailed Sig
-8.155	7.719	1.151	-7.09	44	.000

Critical t-value ±2.02

Results: Reject the Null Hypothesis